

the gear as necessary to engage the three notches in the blocking ring with the synchronizer inserts. Secure the first gear with the thrust washer and snap ring.

8. Slide the blocking ring onto the tapered machined surface of the second gear. Slide the second gear with blocking ring, and the second and third gear synchronizer onto the mainshaft. The tapered machined surface of the second gear must be toward the front of the shaft. Make sure that the notches in the blocking ring engage the synchronizer inserts. Secure the synchronizer with a snap ring. Measure the end play between the synchronizer and snap ring with a feeler gauge. End play should be 0.004 installed.
9. Coat the bore of the input shaft and gear with a thin film of grease. **A thick film of grease will plug the lubricant holes and prevent lubrication to the bearings.** Install the 15 bearings (Fig. 15) in the bore.
10. Position the output shaft assembly in the case. Position the second- and third-speed shift fork on the second- and third-speed synchronizer.
11. Install input shaft through the front of the transmission with the snap ring in the bearing groove.
12. Align the second- and third-speed shift fork with the shift rail bores and slide the shift rail into place with the interlock pin in a horizontal position, (use grease to hold the pin in the rail bore). Rotate the rail 90 degrees until the three detents are facing toward the outside of the case (vertical). Place the second- and third-speed synchronizer in the second-

speed position (toward rear of transmission), and secure the fork to the rail with the set screw.

13. Move the synchronizer to the neutral position.
14. Install the interlock pin in the case. If the second- and third-speed shift rail is in neutral position, the top of the interlock pin will be slightly lower than the surface of the first and reverse shift rail bore.
15. Place the first and reverse shift fork in the groove of the first and reverse synchronizer. Rotate the fork into position and install the first and reverse shift rail. Move the rail inward until the center notch (neutral) is aligned with the detent bore. Secure the fork to the shaft with the set screw.
16. Install a new shift rail expansion plug in the front of the case flush with or to 0.60 inch below the face of the case to prevent interference with the clutch housing installation.
17. Hold the input shaft and blocking ring in position. Then move the output shaft forward to seat the pilot in the roller bearings of the input gear.
18. Tap the input gear bearing into place in the case while holding the output shaft to prevent the roller bearings from dropping. Install the front bearing retainer and new gasket, making sure that the oil return slot is at the bottom of the case. Install and torque the attaching screws to specification.
19. Install the large snap ring on the rear bearing. Place the bearing on the output shaft with the snap ring end toward the rear of the shaft. Press the bearing into place with the tool shown in Fig. 13. Secure the bearing to the shaft with a snap ring.
20. Hold the speedometer drive gear lock ball in the detent and slide the speedometer drive gear into place. Secure the gear with a snap ring.
21. Place the transmission in the vertical position. Working with a screwdriver through the drain hole at the bottom of the case (if equipped), align the bore of the countershaft gear and the thrust washers with the bore of the case.
22. Working from the rear of the case, push the dummy shaft out of the countershaft gear with the countershaft. There is a countershaft-to-case clearance of 0.020 inch at the front bore and 0.010 at the rear bore. Install a new expansion plug in the countershaft bore at the front of the case. Install the plug flush with or to 0.006-0.60 inch below the

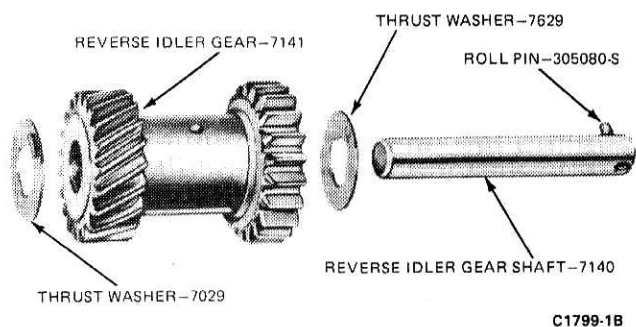


FIG. 10 Reverse Idler Shaft Disassembled

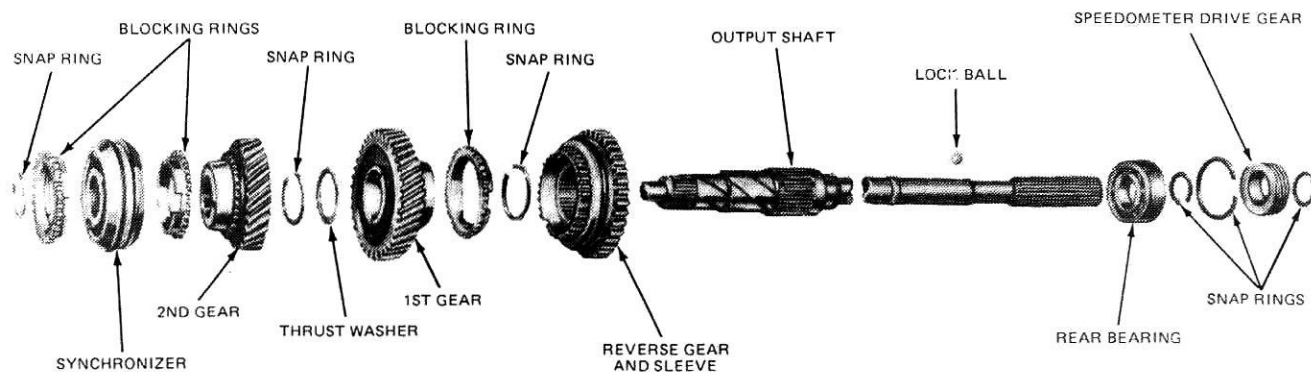


FIG. 11 Output Shaft Disassembled

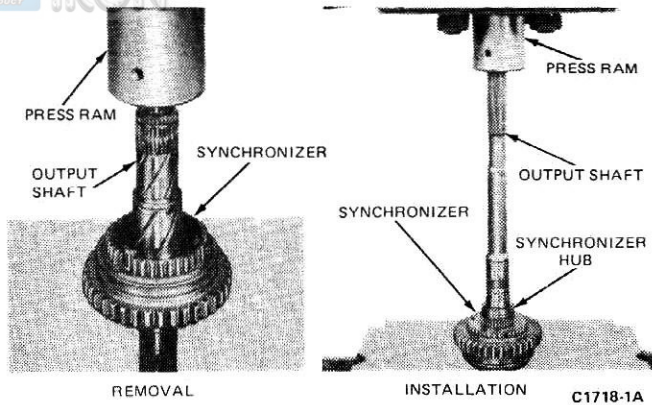


FIG. 12 Removing and Installing First and Reverse Synchronizer

face of the case to prevent interference with the clutch housing installation.

23. Coat a new extension housing gasket with sealer and position it on the case.
24. Install lockwashers on the five attaching screws. Dip the threads of the capscrews in the sealer. Secure the housing to the case and torque the capscrews to specification. Install the drain plug in the case, if so equipped. Install the filler hole plug.
25. Place the transmission in gear. Pour the specified transmission lubricant over the entire gear train while rotating the input or output shaft.
26. Install the remaining detent pin in the case. Install the long spring down against the detent pin.
27. Coat a new cover gasket (Fig. 4) with sealer. Secure the cover with capscrews. Torque the screws to specification.
28. Check the operation of the transmission in all of the gear positions.

SUB-ASSEMBLIES

Shift Levers and Seals

1. Remove the nut, lock washer, and flat washer that secure each shift lever (Fig. 14) to the shaft and lever in the transmission case. Lift the levers off the shaft. Slide each lever and shaft out of the case. Discard the O-ring from each shaft.
2. Lubricate the new O-ring seals with transmission lubricant and install them on the shafts.
3. Install the lever and shafts in the case.
4. Position a shift lever on each shaft and secure them with a flat washer, lock washer, and nut.

Input Shaft Bearing

1. Remove the bearing outer snap ring and the snap ring securing the input shaft bearing. Press the input shaft out of the bearing using the tools shown in Fig. 7.
2. Press the input shaft bearing onto the input shaft with the tools shown in Fig. 13, and install the snap ring on the shaft.

Synchronizers

1. Lightly punch or etch alignment marks on the hub and sleeve of the synchronizer before disassembly.

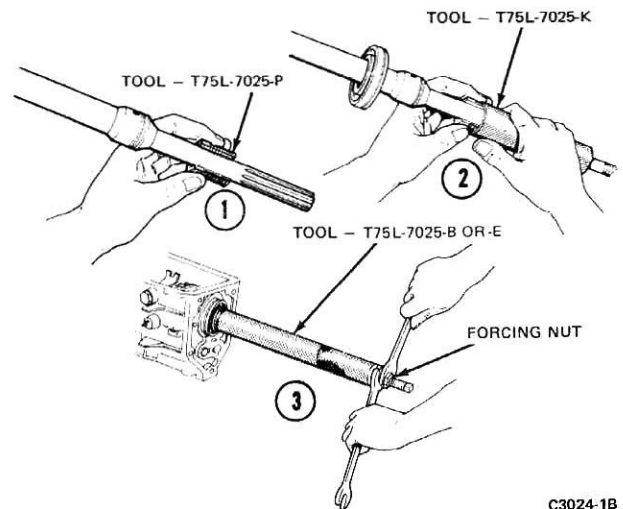


FIG. 13 Installing Input or Output Shaft Bearing

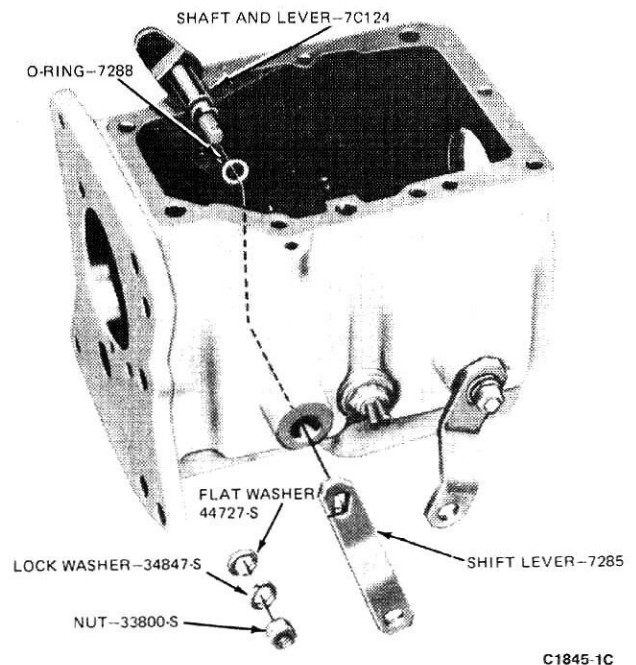


FIG. 14 Shift Lever and Shaft Disassembled

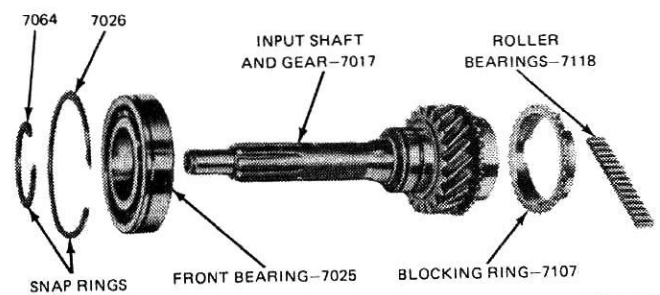


FIG. 15 Input Shaft Gear Disassembled

Push the synchronizer hub from each synchronizer sleeve.

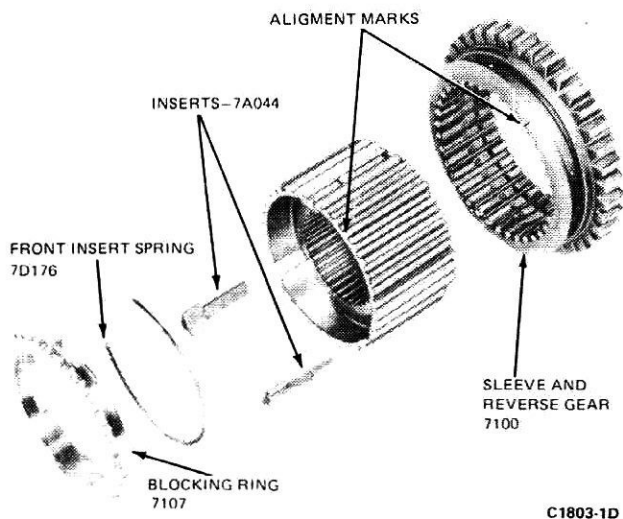


FIG. 16 First and Reverse Synchronizer Disassembled

2. Separate the inserts and insert springs from the hubs. Do not mix the parts from the second- and third-speed synchronizer with the first and reverse synchronizer (Figs. 16 and 17).
3. Install the insert spring in the hub of the first and reverse synchronizer. Make sure that the spring covers all the insert grooves. Start the hub on the sleeve, making sure that the alignment marks are properly indexed. Position the three inserts in the hub, making sure that the small end is on the inside of the hub. Slide the sleeve and reverse gear onto the hub.
4. Install one insert spring (Fig. 17) into a groove of the second- and third-speed synchronizer hub, making sure that all three insert slots are fully covered. With the alignment marks on the hub and sleeve aligned, start the hub into the sleeve. Place the three inserts on top of the retaining spring and push the assembly together. Install the remaining insert spring so that the spring ends cover the same

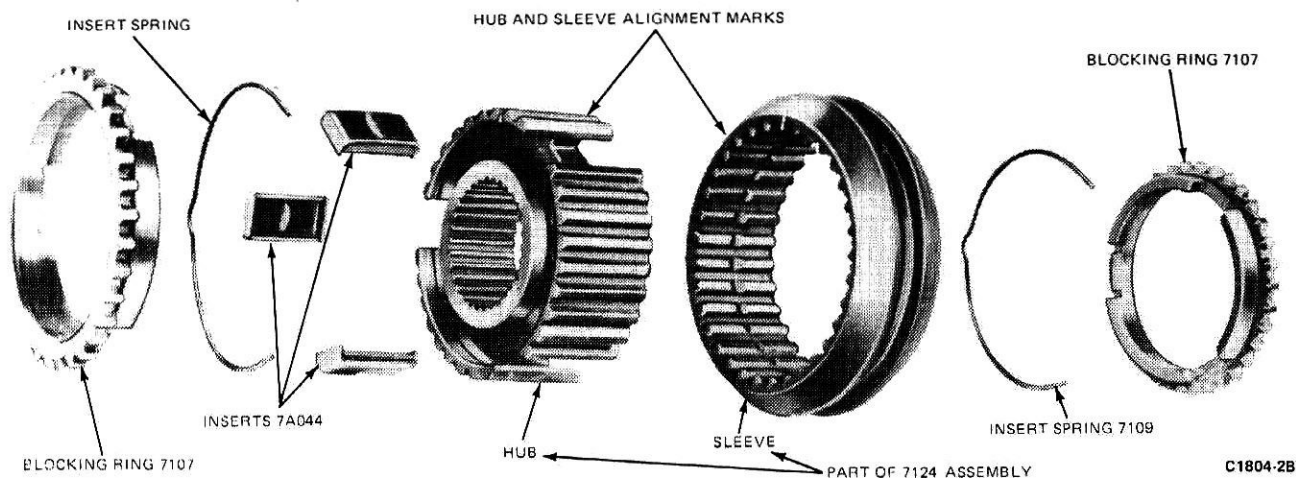


FIG. 17 Second and Third Synchronizer Disassembled

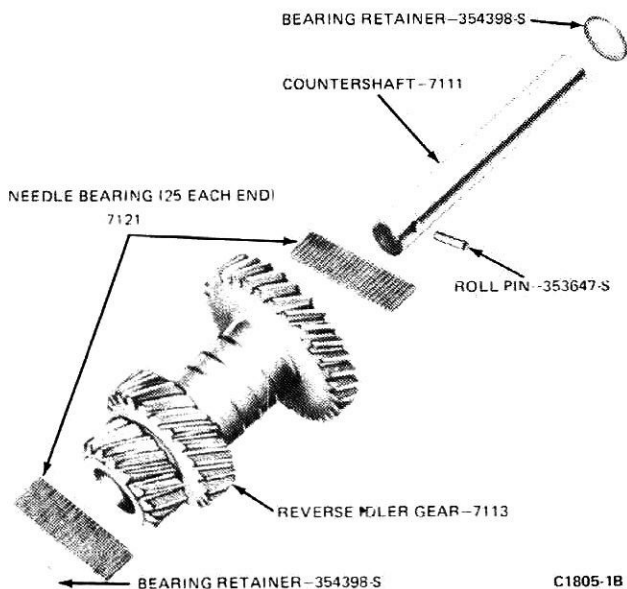


FIG. 18 Countershaft Gear Disassembled

slot as does the other spring. Do not stagger the springs. Place a synchronizer blocking ring on each end of the synchronizer sleeve.

Countershaft Gear Bearings

1. Remove the dummy shaft, fifty needle bearings, and the two bearing retainer washers from the countershaft gear (Fig. 18).
2. Coat the bore in each end of the countershaft gear with grease.
3. Hold the dummy shaft in the gear and install the twenty-five needle bearings and a retainer washer in each end of the gear.
4. Position the countershaft gear, dummy shaft, and needle bearings in the case.
5. Place the case in a vertical position. Align the gear bore and the thrust washers with the bores in the case and install the countershaft.
6. Place the case in a horizontal position and, using a feeler gauge, check the countershaft gear end play. If not within specification, replace the thrust washers.

7. After establishing the correct end play, install the dummy shaft in the countershaft gear and allow the

gear to remain at the bottom of the case until the output and input shafts have been installed.

SPECIFICATIONS

3 SPEED TRANSMISSIONS

Car Model	Engine	Transmission Model	Gear Ratio			
			1st	2nd	3rd	Reverse
Fairmont/ Zephyr	4.1L (200 CID)	RAN-DM	3.56	1.90	1.00	3.78

TRANSMISSION COMPONENT END PLAY

Component	Inches
Cluster Gear to Case	.004-.018
Reverse Idler Gear to Case	.004-.018

LUBRICANT REFILL CAPACITY (TO BOTTOM OF FILLER HOLE)

Transmission Type	Application	Lubricant Specification	Capacity (Pints)
3 Speed	All Models	ESP-M2C83-C	3.5*
*3 Pints Imperial Measure			

TORQUE SPECIFICATIONS

Component	Torque Ft-Lb 3 Speed	Component	Torque Ft-Lb 3 Speed
Input Shaft Bearing Retainer to Case Bolt	30-36	Shift Fork to Shift Rail Screw	10-18
Extension Housing to Case Bolt	42-50	Filler Plug to Case	10-20
Access Cover to Case Screw	20-25	Transmission to Flywheel Housing	37-42
Outer Gear Shift Levers to Cam and Shaft Nut	18-23		

SPECIAL TOOLS

Tool Number	Description	Tool Number	Description
T50T-100A	Impact Hammer – Long	T75L-7025-L	Shaft Adapter
T59L-100B	Impact Hammer – Short	T75L-7025-P	Collar – Shaft
Tool – 1175AB	Grease Seal Remover	T64P-7111-A	Cluster Gear Roller Retainer Shaft
T52L-7000-GAE	Extension Housing Bushing and Seal Remover	T63P-7111-A	Cluster Gear Roller Retainer Shaft
T75L-7025-B	Remover – Replacer Tube	T64P-7140-A	Reverse Idler Shaft Remover
T75L-7025-C	Remover – Replacer Tube	T61L-7657-A	Transmission Extension Housing Oil Seal Replacer
T75L-7025-E	Collet – Bearing Remover	T57P-7697-B	Extension Housing Bushing Replacer
T75L-7025-G	Sleeve – Collet	T57P-7657-G	Shift Linkage Grommet Replacer
T75L-7025-J	Screw	T67P-7341-A	Input Shaft Seal Installer
T75L-7025-K	Sleeve – Replacer		

CC2140-2K

Model RAD Four-Speed Transmission

PART
16-28

Applies To Mustang II

SUBJECT	PAGE	SUBJECT	PAGE
DESCRIPTION AND OPERATION		REMOVAL AND INSTALLATION	
Transmission	28-1	Shift Lever	28-2
		Transmission	28-3
DISASSEMBLY AND ASSEMBLY			
Transmission – Assembly	28-8		
Transmission – Disassembly	28-4	SPECIFICATIONS AND SPECIAL	
Transmission Sub-Assemblies	28-4	SERVICE TOOLS	28-9

CC3322-2A

DESCRIPTION AND OPERATION

TRANSMISSION

The Model RAD four-speed transmission can be identified by the identification tag (Fig. 1). The tag is located under the lower left side extension to transmission case retaining bolt.

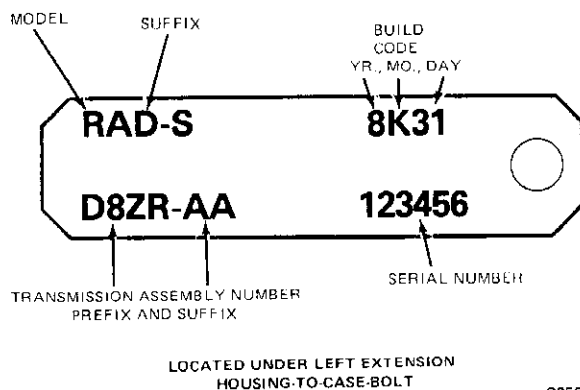


FIG. 1 Transmission Identification

The Model RAD four-speed transmission is of the fully synchronized type with all gears except the reverse gear being in constant mesh. All forward-speed changes are accomplished through forged blocker ring synchronized units.

The constant mesh gears, that is, the input shaft gear, the three other forward gears on the output shaft,

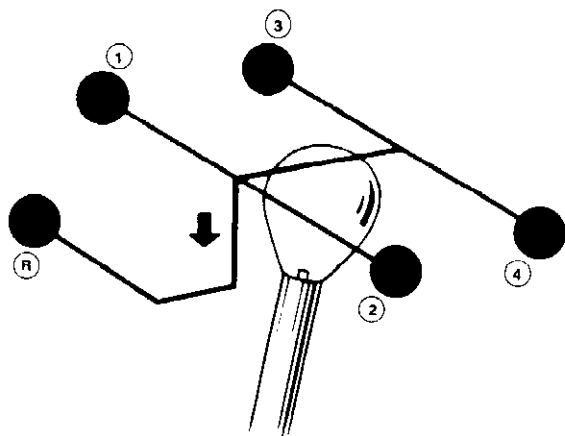
and the corresponding gears on the countershaft gear, are helically cut. The reverse gear on the countershaft gear has straight-cut spur teeth which mesh, through an idler gear, with spur teeth on the outside of the first-second gear synchronizer sleeve.

Gear selection is by means of a floor shift lever (Fig. 2). The shift lever is attached directly to a single selector rail, which has the selector lever assembled to it, and is mounted in the transmission. Movement of the shift lever, and thereby the selector rail, causes the selector lever to locate in the appropriate selector fork and move it to the required position. Movement of the first-second or third-fourth selector fork causes the appropriate synchronizer sleeve to move as necessary to engage with the dog teeth on the required gear.

When reverse gear is required, movement of the reverse selector relay lever draws the reverse idle gear into mesh with both the reverse gear on the countershaft gear and on the output shaft.

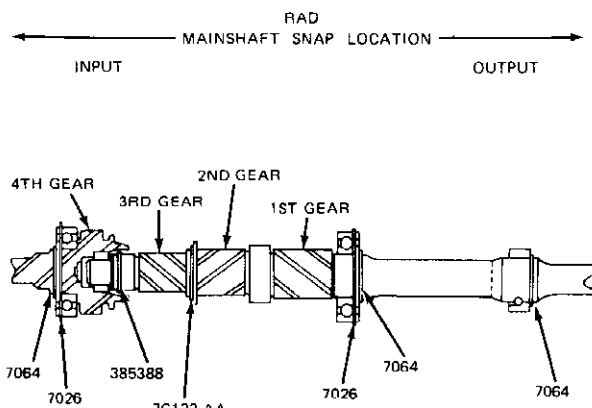
Engagement of two gears at once is prevented by means of a selector interlock plate pivoted in the transmission cover. This plate engages with the selector forks that are not in use, and holds them positively in the disengaged position. The selector forks are not attached to the selector rail. The first-second and third-fourth forks, while they are mounted on the rail, are free to slide when not retained by the interlock plate.

Whenever overhauling the transmission assembly, or a part of the transmission that involves removing a snap ring, be sure to properly install the correct size of brand-new (never used) snap rings (Fig. 3).



C2410-1A

FIG. 2 Gear Shift Lever Positions



SNAP-RINGS PART NUMBERS & LOCATIONS

C2737-1C

FIG. 3 RAD Mainshaft Snap Ring Locations and Parts Numbers

REMOVAL AND INSTALLATION

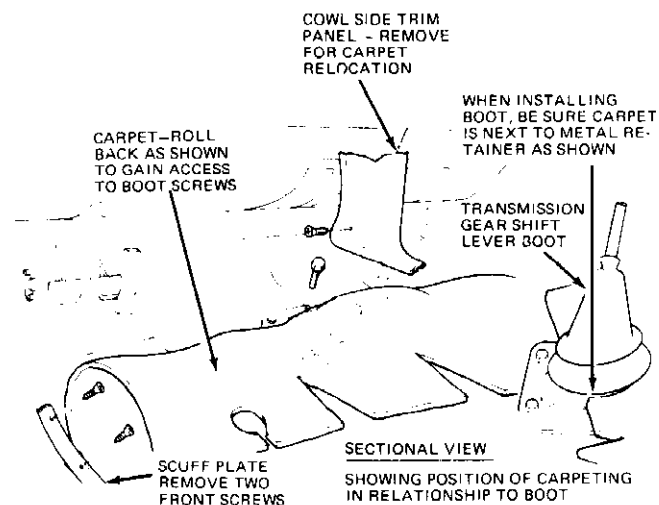
SHIFT LEVER

MUSTANG II

Removal

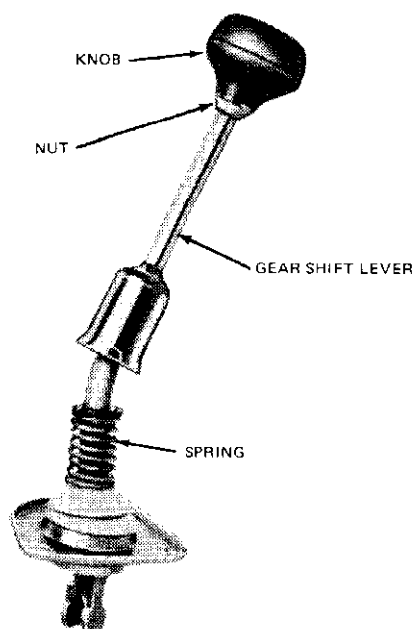
1. Place the gear shift lever in neutral position.
2. Remove the carpet and shift boot (Fig. 4).
3. Remove the three lever-attaching bolts. **Caution: Bolts are metric (M8).**

4. Remove shift lever from extension (Figs. 5 and 6).



C2574-1B

FIG. 4 Shift Lever Boot Removal—Mustang II



C2804-1A

FIG. 5 Shift Lever—Mustang II